

Appl. No.: 10/038,957
Amendment dated October 4, 2004
Reply to Office Action of June 2, 2004

REMARKS/ARGUMENTS

The office action of June 2, 2004 has been carefully reviewed and these remarks are responsive thereto. Reconsideration and allowance of the instant application are respectfully requested.

Applicants again note with appreciation that the Examiner has indicated that claim 6 would be allowable if rewritten in independent form and claim 1 would be allowable if step (a) were amended pursuant to the Examiner's proposed amendment. New claim 16 has been added in response.

Claims 1-8, 12-16 are pending in this application. Claim 1 has been amended to clarify that the claimed methods can be used to make multi-layer composite objects. Claim 1 also has been amended to clarify that the deposited filament and a surrounding portion of the same filament layer and a portion of the underlying filament layer are heated to soften the filament and filament layers prior to application of a compression force which will consolidate and bond the deposited filament and filament layers.

Claim Rejections Under 35 USC §103

Claims 1, 5, 7, 8, 12 and 13 stand rejected under 35 USC §103(a) as being unpatentable over Allaire et al. 5,024,978 in view of Jang et al. 5,936,861. Claims 2, 14 and 15 stand rejected under 35 USC §103(a) as being unpatentable over Allaire et al. 5,024,978 in view of Jang et al. 5,936,861 and further in view of Gardner et al., 5,154,787. Claims 3 and 4 stand rejected under 35 USC §103(a) as being unpatentable over Allaire et al. 5,024,978 in view of Jang et al. 5,936,861 and further in view of Clarke et al., 5,562,966. Reconsideration and withdrawal of these rejections is requested.

Independent amended claim 1 and new claim 16 are directed to methods of making a composite three-dimensional object from a continuous filament formed of green matrix material surrounding a continuous fiber. Briefly, the filament is guided to a movable assembly from which it is deposited in a layer-wise manner onto a working surface associated with the movable assembly. The filament is deposited without any compression forces being applied to the filament as it is being deposited. The deposited portion of the filament then is heated along with the portions of the filament layers adjacent (next to and under) the deposited filament. A

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compression force is applied to the heated portion to consolidate and bond the green matrix material of the deposited filament and portions of the adjacent filament layers. Thus, concurrent use of localized heat and pressure is utilized to form the object, so that bonding is achieved between the newly-deposited portion of the filament and the previously-deposited filament layers around the filament. Consolidation of the deposited filament layers also is achieved. Dependent claims 2, 3, 5-8 and 12-15 each depend from claim 1. Dependent claim 4 depends from claim 3.

The Office Action concedes that Allaire et al. do not disclose making a lay-up of fiber by using a movable assembly to deposit coated fiber on a working surface. Jang et al. is cited for describing that three-dimensional composite material objects can be made in a cost-effective fabrication process from continuous fiber reinforced composite material in a layer-by-layer manner using a dispensing head to dispense a mixture of reinforcement fiber impregnated with a matrix material onto a base member. Jang et al. do not describe methods for laying up a filament into an object without use of compression forces, as is experienced when a filament is passed through the heated extrusion nozzle of Jang et al. Jang et al. also fail to disclose consolidating and bonding the deposited filament and filament layers by heating the deposited filament, after it has been deposited, along with the portions of the filament layers surrounding the deposited filament, and compressing the heated, deposited filament. Thus, neither Allaire et al. nor Jang et al. disclose, teach or suggest the invention of claims 1-5 or 7-8 or dependent claims 12-15. The teachings of Gardner et al. and Clarke et al. also do not overcome these deficiencies of Allaire and Jang.

None of the cited references, whether taken alone or in combination, disclose, teach or even suggest the present methods for making a composite three-dimensional object as claimed in claim 1, as well as new claim 16. The dependent claims 2-5, 7-8 and 12-15 specify further limitations and are allowable over the cited references for at least the same reasons that claim 1 is allowable. Reconsideration and withdrawal of the rejections are respectfully requested.

Statement of Common Ownership With Respect to Claim Rejection Under 35 USC §103

Claims 1, 3-5, 7, 8, 12 and 13 stand rejected under 35 USC §103(a) as being unpatentable over Hilmas et al. (U.S. Patent No. 6,355,338) in view of Jang et al. Claim 2 stands rejected under 35 USC §103(a) as being unpatentable over Hilmas et al. as applied to claim 1 above, and

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further in view of Gardner et al. The present application, Application Serial No. 10/038,957, and U.S. Patent No. 6,355,338 were, at the time the invention of the present application was made, owned by, or subject to an obligation of assignment to, Advanced Ceramics Research, Inc. In view of this, reconsideration and withdrawal of these rejections are requested.

Double Patenting

Claims 1, 3, 5, 7, 8, 12 and 13 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9 and 10 of U.S. Patent No. 6,355,338 in view of Jang et al. and Allaire et al. Applicants enclose herewith a Terminal Disclaimer with respect to the commonly-owned cited patent, U.S. Patent No. 6,355,338, to obviate this rejection. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 2 stands rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9 and 10 of U.S. Patent No. 6,355,338 in view of Jang et al. and Allaire et al. as applied to Claim 1 above, and further in view of Gardner et al. (U.S. Patent No. 5,154,787). As stated above, Applicants enclose herewith a Terminal Disclaimer with respect to the commonly-owned cited patent, U.S. Patent No. 6,355,338, to obviate this rejection. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 4 stands rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9 and 10 of U.S. Patent No. 6,355,338 in view of Jang et al. and Allaire et al. as applied to Claim 3 above, and further in view of Clarke et al. (U.S. Patent No. 5,562,966). As stated above, Applicants enclose herewith a Terminal Disclaimer with respect to the commonly-owned cited patent, U.S. Patent No. 6,355,338, to obviate this rejection. Reconsideration and withdrawal of this rejection is respectfully requested.

CONCLUSION

In view of the above remarks, prompt reconsideration and full allowance of the claims pending in the subject application are respectfully requested. As all rejections having been addressed, Applicants respectfully submit that the instant application is in condition for allowance, and respectfully solicit prompt notification of the same.

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The Commissioner is authorized to debit or credit our Deposit Account No. 10-0733 for any fees due in connection with the filing of this response.

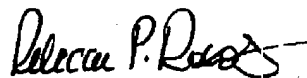
If the Examiner should have any questions, the Examiner is invited to contact the undersigned at the number set forth below.

Respectfully submitted,

BANNER & WITCOFF, LTD.

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